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SOME ASPECTS OF COOPERATION AMONG HUNGARIAN FIELDCROPS FARMS

WYBRANE ASPEKTY WSPÓŁPRACY WĘGIERSKICH ROLNIKÓW PROWADZĄCYCH GOSPODARSTWA ROLNE

Key words: asset supply, cooperation willingness, efficiency, farm size

Słowa kluczowe: dostarczanie aktywów, chęć do współpracy, efektywność, wielkość gospodarstwa

Abstract. In Hungary, following the political transformation, a lot of heterogenous private farms started to operate, which are still characterized by structural and efficiency problems as well as – due partly to the frequently unreasonable subsidy policies – resource allocation dilemmas. The Western-European agricultural economies have already found the adequate responses to these problems in different forms of cooperation, but the Hungarian implementation of these solutions has failed due to the rejection of farmers, in spite of different trials. The research made earlier on the subject has revealed that the main reason of failure is the low cooperation willingness of farmers. Therefore in the present work I try to explore how the economic factors providing the condition system of farming affect the cooperation willingness of farmers.

Introduction

The social transformation of the early 1990s resulted in a structural transformation of agriculture in Hungary. The result of structural „vacuum" following the elimination and transformation of the former large-scale farm system, is a large number of private farms. They constitute a heterogeneous group, which – even today – can be characterized by structural problems [Takács, Sadowski 2005, Magó 2006].

It is obvious that under these structural conditions it is difficult to ensure – among other things – appropriate technical resources on sound economic basis which would be necessary for the operation of economic units [Magó 2008]. Studying the related statistical data, it can be stated that in 15 years following the political transformation in Hungary, the agricultural machine capacities had almost doubled which had improved the machine supply of newly founded farms, but due to this, the machine efficiency had significantly worsened within the whole sector [Takács, Bojar 2003].

In addition to the decreasing efficiency of equipment, the allocation of resources means another problem. The significant capacity surplus and capacity deficit at farm level is a parallel phenomenon. It is obvious that the machine management and the organization of machine works is very complicated and – probably – very expensive under these conditions.

The accession of Hungary to the European Union (EU) in 2004 offers unique possibilities for the agriculture because significant amount of development funds has been made available between 2007 and 2013. However, it cannot be forgotten that Hungary got serious competitors at the same time. Therefore, the economic competitiveness of farms should receive high priority, which requires the rational reduction of input volume. Significant part of expenditures of field crop production is made of costs connected with machine operation, therefore – considering also the current situation – it can be the area, where we have some considerable reserves to increase efficiency [Gockler 2007].

The world market developments also urge the enhancement of agricultural competitiveness. The strong EU protectionist agricultural policy has been a permanent subject of talks under the WTO. Some developing and some developed countries (mainly the United States, New Zealand and Australia) have actively demanded the reforms of the subsidy system. In July 2005 the situation was so serious just prior to the summit of developed countries that the United States President suggested to the EU leaders to end subsidizing agricultural producers [Bird, Rumbelow 2005].

At the same time, there already have been voices within the EU pressing for agricultural subsidy cutbacks. The quick implementation of such a plan, mainly due to the complicated spheres of interest, cannot be expected, but it draws attention of agricultural producers to the preparation for a decreased intervention and the growing implementation of market rules [Takács, Takács 2004].

The above outlined problems require the search of solutions. In our opinion, the „virtual large-scale farm" is a good alternative. The virtual large-scale farm is a specific form of cooperation among farmers. In its framework, the farmer can keep his/her independence, but the relevant resources in the production process (primarily machines and related technologies) are used in large-scale way and efficiency. Actually, the virtual large-scale farms are cooperations or partnerships concerning production [Kovács et. al. 2003]. Many forms of cooperation can be regarded virtual large-scale farm, but the most important ones are as follows: machine cooperation, machine partnerships, lease machine providing, machine and farm assistance rings and machine rent.

Following the political transformation there had been trials to implement the above outlined cooperation solutions – basically according to Western-European patterns – but our research made in the recent years revealed that these efforts were less successful than it had been hoped in professional circles earlier. The experiences proved that the main obstacle in extending the other solutions was the low cooperation willingness of farmers [Takács et. al 2005, 2006].

The cooperation willingness of farmers, as the basic condition of efficient organisation and operation of communities based on human cooperation, has been the subject of many research projects [Hansen et al. 2002, Bakucs et. al. 2007]. These projects have clearly proved the role of psychological/sociological factors in the question. The present paper tries to approach the questions of cooperation willingness from other aspect: through the economic factors of cooperation.

Material and methods

The primary data are used to examine the willingness to co-operate (w-t-c) among Hungarian farmers and factors affecting such cooperation. A survey were conducted in South-Eastern Hungary, i.e., the Southern Great Plain region in Békés county. Agriculture has great importance in the region, due, partly, to the extremely favorable agricultural resource base (e.g., high-quality soils in large fields), and partly due to the economic necessity (lack of alternatives). The region traditionally has an agricultural image.

The survey was made in 2007. The sample was selected with the so-called „snow-ball" method. I called on the farmers personally in their residences. First I collected basic information about the farm with a questionnaire. I completed the questionnaires on the basis of the farmers' responses. The question probed farmers for information about general farm features (forms of farming, group of activities, area of owned and rented land); the natural indices of farming (production structure or crop mix, yields, available machinery, etc.); and covered also the areas connected with the w-t-c (frequency and method of co-operation).

Since on average 91.9% (s=16%) of farm-level Standard Gross Margin (SGM) of the surveyed farms is generated by field crops, the farms are classified as specializing in field crops (Fieldcrops) given the EU typology. The number of elements (N) of the examined sample is 71 individual farms, which represents 0.18% of all farms in Békés county, and a 0.02% term share at the country level. As regards the type of farms, the surveyed farms represent a 0.69% share at the county and 0.04% at the national level.

To express the w-t-c, the respondents evaluated their inclination to co-operate on a scale from 1 to 4. The choice of an option on a scale implied: 1 = does not intend to co-operate with anybody at present and in the future (completely unwilling); 2 = co-operates rarely and does not plan to change in the future; 3 = co-operates with fellow farmers with medium frequency, is not averse to the idea of making such relations closer; and 4 = co-operates often and plans to continue to do it in the future (completely open).

I have presumed during the research that the economic factors affecting the cooperation willingness of farmers can be divided into three groups, as follows: size of farm and income producing potential of farm; the asset supply of the farms, and efficiency of farming activities. The grouping was made on the basis of our examinations carried out in the previous years [Takács et. al 2005, 2006]. Several indices were made in order to express the presumed economic affecting factors (Figure 1). The relation between the indices concerning farms and the cooperation willingness of farmers was analysed with factor analysis.

Three indices were introduced in order to express the size of the farm, including the productivity. The TFA (Total Farm Area) [ha] expresses the size of the total arable land (own and leased) used by the farms. The Economic Size (ES) [ESU] of each farm was determined according to the EU methodology. The Gross Production Value (GPV) [EUR/farm] index was used to mark the farm performance. It is determined by the multiplication of sector size, sector productivity and the average sales price.

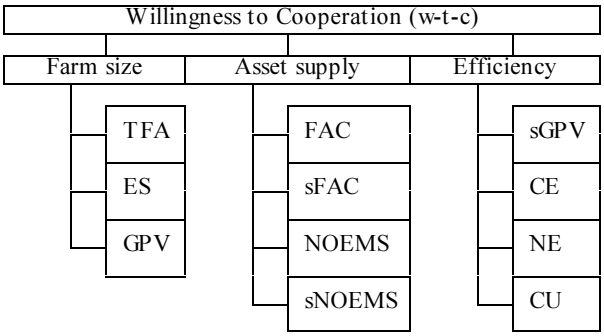

Figure 1. Indices expressing factors that affect cooperation willingness
Source: own construction.

The supply of farms with technical resources are described with the following indices: FAC (Fixed Asset Capital) [EUR/farm] expresses the value of asset capital fixed in technical resources. The asset value was determined on market prices. The sFAC index (specific Fixed Asset Capital) [EUR/ha] shows the value of capital locked on area unit in the examined farms. In order to explore the level of mechanization of a given farm and its self-sufficiency regarding mechanization, the (specific) Need of External Machinery Services (sNoEMS) [EUR/farm; EUR/ha] index was developed. On the basis of the technological needs imposed by the farm production structure, the index shows the amount of labor shortage given by the farm own resource base. The shortage elimination requires a purchase from external lease providers. The value was determined by using fees for hired services.

Table 1. Describing statistics of variable set

Detailed list	N	Min	Max	Average	St. Dev.
TFA [ha]	71	1.8	291.4	59.6	57.1
ES [ESU]	71	0.7	112.4	24.5	24.1
GPV [EUR/farm]	71	921.6	192814.0	37116.5	38016.6
FAC [EUR/farm]	71	0.0	335740.0	44165.2	54859.0
sFAC [EUR/farm]	71	0.0	2592.1	785.7	579.3
NoEMS [EUR/farm]	71	0.0	13440.0	2568.3	2560.7
sNoEMS [EUR/farm]	71	0.0	276.0	75.3	63.8
sGPV [EUR/farm]	71	267.8	1600.0	617.2	215.8
CE [-]	71	0.19	4.29	1.17	0.80
NE [GU t/ha]	71	2.68	6.97	4.85	0.99
CU [%]	71	0.77	44.85	11.81	8.97
w-t-c [-]	71	1	4	2.42	1.15

Source: own calculation.

The last presumed factor is the efficiency factor which is represented by four indices. The specific GPV index [EUR/ha] shows the efficiency of utilisation of arable land used by the farm. The capital efficiency index (CE) (-) measures the efficiency of machine assets capital earmarked during farming. It was the quotient of gross production value of crop production sectors and the value of total machine assets at market prices. In order to express the natural efficiency (NE) of crop production, the natural yield per area unit was used. Due to the diversified production structure and for the sake of clear comparison, the natural yield was determined in „cereal unit" [GU t/ha]. A model was used for analysing the capacity exploitation of technical resources in the farms (CU) (%) The estimated global utilization value at farm-level was calculated on the basis of the work performed on the farm. The normal hectare was used as exchange value.

Some important statistical features of variables involved in the examination are in Table 1.

Results

I have made factor analysis in order to explore the latent structure between the presumed factors which affect the cooperation willingness of farmers. Unfortunately, the statistical examination has not brought the expected result. The originally compiled 11-element variable set was not suitable for the determination of latent structures according to the Kaiser-Meyer-Olkin (K-M-O)

index (although the significance of Barlett-test was 0.000!) The reduction of variable set on the basis of communalities has not resulted any improvement, either. The problem was solved with the help of Principle Component Analysis (PCA). One Principle Component (PC) was determined to replace each of the originally compiled variable group (Table 2).

The principle component (PC1) substituting the variables which express the farm size and productivity contains more than 98% of the information embodied in the three original variables. The main component is in close correlation with all the three original variables. The proportion of information in the other two principle components is lower but it is still well above the critical 30-35% value. During the calculation of the second principle component, the NOEMS index was taken

Table 2. Typical features of main components replacing the active components

Detailed list	PC1			PC2			PC3		
	TFA	ES	GPV	FAC	sFAC	sNOEMS	sGPV	CE	CU
u	-0.581	-0.574	-0.577	-0.647	-0.537	0.540	0.543	0.681	0.492
a (r)	-0.991	-0.980	-0.985	-0.885	-0.734	0.738	0.670	0.840	0.607
Cumulative %	98.1			62.2			54.2		
K-M-O	0.738			0.585			0.533		
Bartlett's sig.	0.000			0.000			0.000		

u = principle component coefficients; a (r)= correlation coefficients .
Source: own calculation.

out from the variable set due to the low communality. The remaining indices could be regarded as the elements of principle component expressing the asset supply of farms on the basis of correlation coefficients. It should be noted that there is an opposite relation between the degree of asset supply and the specific capacity deficiency within the set of variables, which is not surprisable. Due to the low fitting level, one out of the four original variables – namely the variable expressing the natural efficiency (NE) was left out from the production of the third principle component (PC3). The fictive variable determines mostly the value of capital efficiency (CE) (r^2=0.7), while it has greater than 0.25 determination, which can be regarded as critical value, on the other two efficiency-expressing variables.

Following the determination of the Principle Component Scores belonging to the principle components, I examined the main tendencies according to cooperation willingness and looked for the main relations (Table 3).

Mixed experiences could be concluded from the analysis of the cooperation willingness through the principle component expressing the farm size. It can be generally stated that the lowest cooperation activity (value 1 and 2) is demonstrated typically by the larger size units. It is indicated by the low negative value of PC1 scores belonging to cooperation level 1 and 2*. Another generalising statement is that by the decreasing of size units the cooperation activity of farms is improving, which can be concluded from the rising average value of principle component scores. Studying the related dispersion values, it is obvious that this value is high at the lower cooperation

Table 3. Typical values of principle component scores at the different levels of cooperation willingness

Detailed list	Level of the w-t-c											
	1			2			3			4		
	PC1	PC2	PC3	PC1	PC2	PC3	PC1	PC2	PC3	PC1	PC2	PC3
Average	-0.56	-0.20	0.44	-0.36	-0.14	0.00	0.23	-0.33	-0.26	0.80	0.71	-0.28
St. Dev.	2.28	1.66	1.46	1.98	1.24	1.31	0.83	1.23	1.11	0.80	1.02	0.86
Min.	-5.27	-4.93	-1.42	-6.76	-3.27	-1.38	-1.78	-3.75	-1.92	-1.34	-1.84	-1.73
Max.	1.70	2.95	3.72	1.66	1.85	2.53	1.41	1.67	2.35	1.57	2.22	0.90

Source: own calculation.

levels which indicates that the aversion towards cooperation is frequent even in case of the smaller economic sizes.

On the basis of PC2 principle component interpreted as a fictive variable which expresses the asset supply of farms, it is not easy to determine a clear tendency. It is obvious, however, from the results that the asset supply is rather poor in the group of those who are the most willing to cooperate and parallel with this, there is a significant lack of capacities, which presumably encourages the farmers to cooperate.

It is similarly difficult to find a clear connection between the Principle Component (PC3) expressing the efficiency of the agricultural activity and the cooperation willingness of farms. Although the average value of scores refers to the fact that the cooperation willingness is improving due to the pressure of the declining production efficiency, the high dispersion values slightly contradict to this tendency.

Describing the observation units (Figure 2) characterized by cooperation willingness in the field of PC1 and PC2 principle components, we are led to an interesting conclusion. In case of smaller size units and in spite of the low asset supply, the farmers are typically reserved from cooperation, presumably owing to the low economic interests. It should also be noted that the well-equipped larger farms stand aloof from cooperation, too. It is a weak, but provable tendency that there is an intent to trade capacity surplus through cooperation in case of average economic sizes and significant asset capacities.

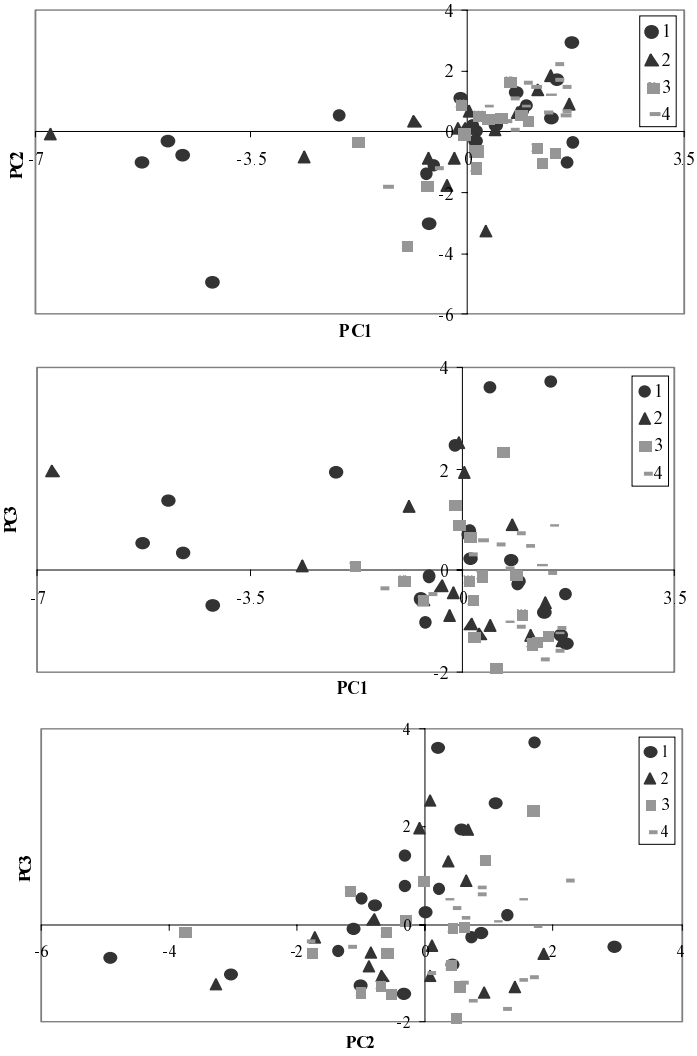

Figure 2. Cooperation willingness on the basis of principle components
Source: own construction.

In the field of PC1 and PC3 principle components it is a proved tendency that the efficiency of production is improving by the increase of economic size, and it can also be proved that efficient production is possible even with smaller economic sizes. The experiences have revealed that the efficient large-scale farms are reserved from, while the efficient small farms prefer cooperation.

* Explanation: the matrix of principle component scores is the multiplication product of standardized basic data matrix and matrix of principle component coefficients (*B=ZU*). According to this, since the coefficients belonging to the variables took negative values (Table 2), the result of standardization determines the sign of scores! Values describing a size unit above the average results „negative" scores, while the values below the average have „positive" scores.

It can be verified in the field of asset supply and efficiency that the utilisation of resources is typically low in the farms with significant asset supply. Another problem is that most of these farms stand aloof from cooperation although it would be an alternative to trade capacity surplus.

Conclusions

The experiences of the research prove that the cooperation willingness of farms is increasing by the decreasing of the economic size – due mainly to the forcing economic factors. On the other hand, the smallest farms show the biggest deviation from this thesis because their economic interests are low owing to the small size and the related special features (e.g. part-time work).

Another conclusion to note is that the main economic factors which provide the condition system for farming hardly explain the cooperation motivation of farmers which means that rather the role of psychological factors is dominant.

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Streszczenie

W artykule przedstawiono analizy wybranych aspektów współpracy rolników prowadzących gospodarstwa rolne na Węgrzech. Określono wpływ różnych czynników ekonomicznych na chęć rolników do współpracy.

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